What is Claimed is:

Sub. A.

1. A catalytically operating burner, comprising:

a heat-resistant carrier material that forms the walls of several adjoining channels that pervade the catalyzer structure in longitudinal direction and permit a gaseous reaction mixture to flow through the catalyzer structure;

wherein the walls are coated at least in part with a catalyst;

wherein between an inlet end and an outlet end of the catalyst structure, communicating openings are constructed in the walls, through which the adjoining channels communicate with each other.

2. A burner as claimed in Claim 1, further comprising flow guidance means for redirecting at least part of the flow in one channel into an adjoining channel that communicates with the former channel via the communicating opening, the flow guidance means being associated with at least one of the communicating openings.

Sub B2

3. A burner as claimed in Claim 1, further comprising a turbulator associated with at least one of the communicating openings.

4. A burner as claimed in Claim 2, wherein the flow guidance means are constructed as a turbulator.

5. A burner as claimed in Claim 1, wherein the channels form at least in part a winding flow path through the catalyzer structure (4).

Fig 6

6. A burner as claimed in Claim 1, wherein the walls are coated with the catalyst in such a way that some of the channels are catalytically active while other channels are catalytically inactive or inert.

Sub B2

7. A burner as claimed in Claim 1, wherein the walls are coated with the catalyst in such a way that at least some of the channels have at least one catalytically active zone and at least one catalytically inactive or inert zone in flow direction.

8. A burner as claimed in Claim 1, wherein the walls are coated with the catalyst in such a way that at least some of the channels have several active zones with differently designed catalytic activities in flow direction.

9. A burner as claimed in Claim 1, wherein at least part of the carrier material coated with the catalyst comprises a porous material.

10. A burner as claimed in Claim 1, wherein at least part of the carrier material coated with the catalyst comprises a woven fiber material.

11. A burner as claimed in Claim 1, wherein at least part of the carrier material coated with the catalyst comprises a metal foil.

12. A burner as claimed in Claim 1, further comprising turbulators in the channels, the turbulators being distributed in the channels along the catalyzer structure so that the catalyzer structure is provided in flow direction with at least one zone equipped with the turbulators as well as with a turbulators-free zone.

13. A burner as claimed in Claim 12, wherein one of the at least one zones equipped with the turbulators contains the outlet end of the catalyzer structure.

14. A burner as claimed in Claim 13, wherein the zone of the

Sub B2

catalyzer structure containing the outlet end is constructed catalytically inactive or inert.

15. A burner as claimed in Claim 12, wherein one of the at least one zones equipped with the turbulators contains the inlet end of the catalyzer structure, whereby this zone is also constructed catalytically inactive or inert.

Sub. A2.

16. A burner as claimed in Claim 12, wherein the zone of the catalyzer structure containing the inlet end is equipped with turbulators and is constructed catalytically inactive or inert; that in an area between the inlet end and outlet end of the catalyzer structure at least one catalytically active zone is constructed so that a zone of the catalyzer structure containing the outlet end is equipped with turbulators and is constructed catalytically inactive or inert.

17. A burner as claimed in Claim 12, wherein the zone of the catalyzer structure containing the inlet end is equipped with turbulators and is constructed catalytically highly active; wherein, in an area between the inlet end and outlet end of the catalyzer structure, a turbulators-free zone is constructed catalytically active; and wherein a zone of the catalyzer structure containing the outlet end is equipped with turbulators.

18. A burner as claimed in Claim 1, wherein the carrier material comprises at least several layers, whereby each layer is formed of a material web that has been folded, corrugated, or both, in zigzag or triangular or rectangular shape, whereby the apex lines or apex surfaces of the folds and/or waves in material webs adjoining each other transversely in flow direction are oriented differently, whereby adjoining material webs rest against each other at the intersecting apex lines or apex surfaces and form channels between them.

19. A burner as claimed in Claim 18, wherein the apex lines or apex surfaces are oriented at an angle to the longitudinal direction of the catalyzer structure.

20. A burner as claimed in Claim 1, wherein the carrier material comprises a material web folded several times, whereby the apex lines or apex surfaces of the folds extend approximately in the longitudinal direction of the catalyzer structure, whereby planar wall sections are formed between consecutive apex lines or apex surfaces, whereby adjoining planar wall sections extend parallel to each other, and whereby the channels are formed between the adjoining wall sections.

21. A burner as claimed in Claim 1, wherein the flow guidance means, the turbulators, or both, in the walls are formed by triangular wings, wherein two triangle sides of the wing are cut free and wherein the wing is bent on the third triangle side in such a way that the wing projects into one of the channels, wherein the triangular openings created hereby in the walls form the communicating openings.

22. A burner as claimed in Claim 21, wherein the bent triangle side of the wing extends approximately transversely to the extension direction of the apex lines or apex surfaces of the material web, and that the triangle tip of the wing is pointed upstream.

23. A burner as claimed in Claim 1, wherein at least one of the channels is provided along the catalyzer structure at at least one point with a guide vane structure that is oriented transversely to the flow direction and that forces a stream flowing through it to rotate around an axis extending parallel to the flow direction.

Sub. A. 4.

24. A process of using a catalyzer structure, comprising the step of:

providing a catalyzer structure including a heat-resistant carrier material that forms the walls of several adjoining channels that pervade the catalyzer structure in longitudinal direction and enable that a gaseous reaction mixture flows through the catalyzer structure, wherein the walls are coated at least in part with a catalyst and wherein between an inlet end and an outlet end of the catalyst structure communicating openings are constructed in the walls, through which the adjoining channels are communicating with each other, in a catalytically operating burner; and

flowing a gaseous reaction mixture through the catalyzer structure.